

4. Explore the evoprint for the comparison of sequences from human, chimpanzee, orangutan, rhesus monkey, dog, horse, cat and cow. Use your observations and data from the table above to answer the following questions.
 - a. Make a rough estimate of the percentage of nucleotides that did **not** change in this comparison.
 - b. How much time is represented in this evoprint?
5. Explore the evoprint for the comparison of sequences from human, chimpanzee, orangutan, rhesus monkey, dog, horse, cat, cow, rat, mouse, guinea pig, armadillo and opossum. Use your observations and data from the table above to answer the following questions.
 - a. How much time is represented in this evoprint?
 - b. Identify 2 regions with 8 or more nucleotides in a row that have not changed over the amount of time calculated in the previous step. Write out the nucleotides for these regions.

Criteria for Newspaper Article

Your major task in this activity is to collect the understandings and information you need to write a useful article for your school newspaper on influenza and evolution. A complete article will answer the following questions:

- What is influenza or the “flu”?
- How do scientists use data to explore how influenza genes evolve?
- What evidence do scientists use to conclude that some influenza genes evolve relatively rapidly?
- How can variation develop among influenza viruses?
- How does natural selection help explain the evolution of influenza?
- How does evolution help explain why a new vaccine for influenza is needed every few years?

Use the following table to help organize your description of natural selection in influenza.

Feature of an explanation of natural selection	Describe how the feature works in your example
In what ways does the population vary for an important trait?	
Can some of the differences in traits among individuals be passed from parents to offspring? Explain.	
How did the variation arise?	
Do individuals with certain traits survive and reproduce at relatively higher rates? Explain.	
How will the frequency of traits and the alleles affecting those traits change in the population over time?	

You may want to create a new page for each question in the bulleted list in your notebook. This will help you keep track of your understandings as you proceed through the lesson.

Introduction to Influenza

Influenza basics

Influenza, also called the “flu,” is an illness that is caused by a virus. The influenza virus infects lung cells and causes respiratory illness. The illness caused by the influenza virus can be mild, severe, or even cause death. Influenza has a large impact on human health. For example, on average each year

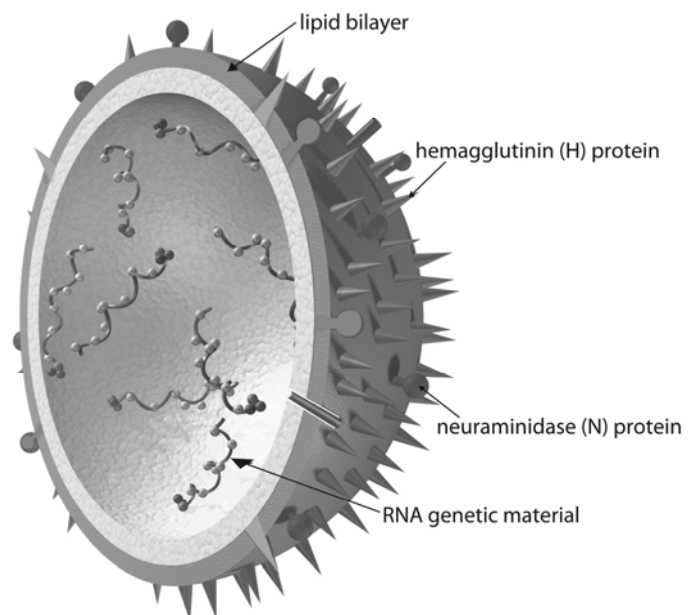
- 5% to 20% of Americans suffer from the flu,
- Complications from the flu result in hospital stays for over 200,000 Americans, and
- Flu-related effects cause the death of about 36,000 Americans, and about 500,000 people across the world.

Symptoms of a flu infection include a high fever, extreme tiredness, muscle aches, a dry cough, sore throat, and a stuffed nose. In otherwise healthy people, symptoms from the flu are usually gone after 4 to 7 days, but they can last longer.

Occasionally, new strains of influenza emerge that cause global pandemics. A pandemic is a large-scale infectious disease outbreak that spreads throughout the world. In the “Spanish flu” pandemic of 1918-19, hundreds of millions of people were infected and about 50 million people died.

Structure of the virus

The influenza virus is made up of genetic material that is surrounded by a membrane. The membrane has two main proteins inserted in the membrane like spikes (see the figure below). The names of these proteins are hemagglutinin (H) and the neuraminidase (N). Influenza has eight segments of RNA that contain 11 genes. Importantly, the genetic material is RNA, not DNA. RNA is more prone to mutations than is DNA.



Influenza virus.

Image credit: NIH's National Institute of Allergy and Infectious Disease.